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The Monthly Evening Sky Map

A JOURNAL FOR THE AMATEUR — FOUNDED BY THE LATE LEON BARRITT
—NORTHERN AND SOUTHERN HEMISPHERE—
ALSO A STAR, CONSTELLATION AND PLANET FINDER MAP
ARRANGED FOR THE CURRENT MONTHS — APR. - MAY - JUNE
MORNING AND EVENING — AND PRACTICAL ANYWHERE IN
THE WORLD PUBLISHED QUARTERLY

Largest Circulation of any Amateur Astronomical Journal in the World

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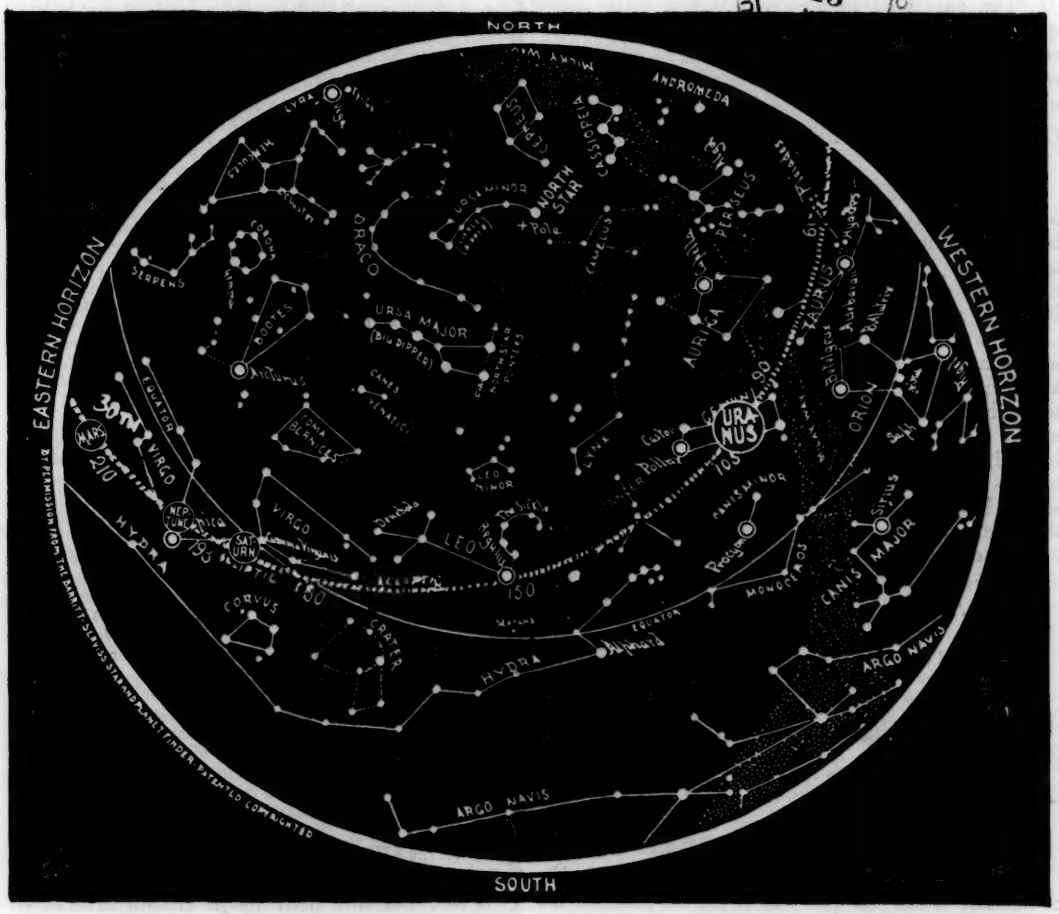
UNIVERSITY OF MINNESOTA
APR 15

EVENING SKY MAP FOR APRIL



Face South And Hold The Map Overhead. The Top North And You Will See The Stars And Planets Just As They Appear In The Heavens. The Arrow Through The Two Stars In The Bowl Of The Big Dipper Points To The North Star. The Star At The End Of The Little Dipper.

AT 9:00 P.M., APRIL 1 8:00 P.M., APRIL 15 7:00 P.M., APRIL 30

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

XUM

"The Coming Conquest of Space"

"The Coming Conquest of Space" was written in 1946 by Harry Akers, Jr., at the age of 12½, as a social science assignment in Balboa Junior High School, Balboa Heights, Canal Zone. It was first published in the Monthly Evening Sky Map in 1946-1948. In 1952, the author, now a student at Colorado School of Mines, Golden, Colorado, at the request of the editors of the MONTHLY EVENING SKY MAP, revised and enlarged the article by means of foot notes. The original text appears in normal type, the recently-added foot notes in italic type.

Chapter I INTRODUCTON

As we gaze upon the skies on a clear night we see a multitude of heavenly bodies which arrest our attention. These are the stars, the planets, our Moon, and perhaps an occasional comet. Man has often wondered what these mysterious bodies are. Today the telescope can give us much information about them — Very much more than primitive Man ever had. But still much about them is left to our imagination. There are many problems unsolved and questions unanswered; among them is the question which has been wondered about for several centuries — *"Is there life on Mars?"* Even the new 200-inch telescope will not be able to answer this very satisfactorily. The only way to answer this and many other questions accurately would be to travel to these heavenly bodies themselves and make them yield their secrets. The only possible means of travel would be in a powerful rocket.

CHAPTER II THE SHIP

A—CONSTRUCTION

Our ship would have to be huge enough to accomodate its mighty motors, and its walls would have to be strong enough to hold up against the pressure of the air inside. It would have to be capable of enormous speeds in order to reach any heavenly body in a reasonable length of time.

The walls of the ship would have to be made of a substance which is a poor conductor of heat, to keep internal heat from escaping, and to keep external heat from entering the ship. The internal walls would be highly-polished to reflect escaping heat back into the ship; the external walls would be highly- polished to reflect heat trying to enter the ship. However, the balance might get uneven, and then we would have to be depending on heating or cooling devices to make up the difference.

The "thermos-bottle" system, the insulated ship with its heating and cooling devices to make up small heat differences might be replaced by a system whereby one side of the ship is highly-polished and the other side dull. The Sun's radiant energy could be either reflected or absorbed, depending on which side of the ship were turned towards the Sun. Such a system would be effective only on trips to the Moon and possibly to Venus and Mars. On trips to inner planets a highly-reflecting ship would be preferable, and on trips to outer planets, one with a high heat-absorbing ability.

"HOW THE MOTOR WORKS"

The rocket works similar to an old-fashioned rifle or musket. When the gun was fired, the force of the shot rushing out the front end gave the gun a "kick" backwards. In the rocket, gases rushing out the rear end give the rocket a "kick" forwards; in the space-rocket, this would be done on a large scale. Gases expanding and pushing in all directions against the walls of the ship would find only one exit, a small opening. They would rush at high speed out this opening (which corresponds to a narrow gun barrel), and give the ship a powerful kick forward. (If atomic energy is being used, it would probably be a good idea for the crew to wear lead-covered suits, or to be protected in some way from radiations from the engine room during the take-off.)

The question was raised shortly after the first publication of this article, "What happens when we reach the vacuum of space, and the rocket has nothing to push against.." A rocket, unlike an airplane, needs nothing to "push against" to propel itself through space. The expanding fuel gases have their own independent motion, and need no outside medium to push against; they merely push forward against the rocket. In fact, a rocket functions better in a vacuum than in air, because the fuel gases are able to escape faster and the rocket itself encounters no air resistance.

The ship would probably run on atomic energy, because only a small amount of the total space in the ship would be required to store a large amount of energy. Still, we would need something to expand and rush out the narrow rocket tubes to give us a forward kick. An atomic reaction, similar to an atomic bomb, but on a smaller scale, would be used to heat some substance to a high temperature and cause it to expand rapidly and rush out the tubes. Water might be a good substance for this, because it expands to many times its original size when heated to its boiling point. Although the space allowed for the atomic energy itself would be very small, a large space would still have to be allowed for the expanding substance.

Just after the end of World War II, much publicity was given to atomic energy and its capabilities — both logical, and somewhat exaggerated. Atomic energy was hailed as the long-sought source of tremendous and highly-compact power, for space-minded readers. (The author confeses that he also had a tendency to fall into the error of assuming the "omnipotence" of atomic energy at this time.) Atomic energy would be a compact ENERGY source, but could not be a FUEL source. An atomic explosion alone could not propel a rocket forward in any controllable manner, but atomic ENERGY could be used to ACTIVATE a substance used as FUEL, such as water. An atomic pile, or possibly a series of small atomic explosions, would generate only HEAT, to vaporize the water rapidly, causing it to expand with great force. The "water fuel" system also makes possible refueling on a planet such as Mars. Liquid nitrogen or helium could be used in place of water, however. The possibility of a chemical fuel should not be overlooked. Liquid hydrogen and chlorine or fluorine, for example, could be burned together and the expanding gas allowed to escape through the rocket tubes. For a one-way crash-land trip or a non-stop round trip to the Moon, an unmanned "step rocket" could be used. Sections of the rocket containing fuel would be dropped off as their fuel supplies were exhausted, finally leaving only the rocket's nose, containing the "payload." The payload could be scientific instruments in the case of a round trip, or an atomic bomb, in case of a crashland trip, to produce an explosion visible from Earth to mark the success of the trip.

B—NAVIGATION

"VELOCITY OF ESCAPE"

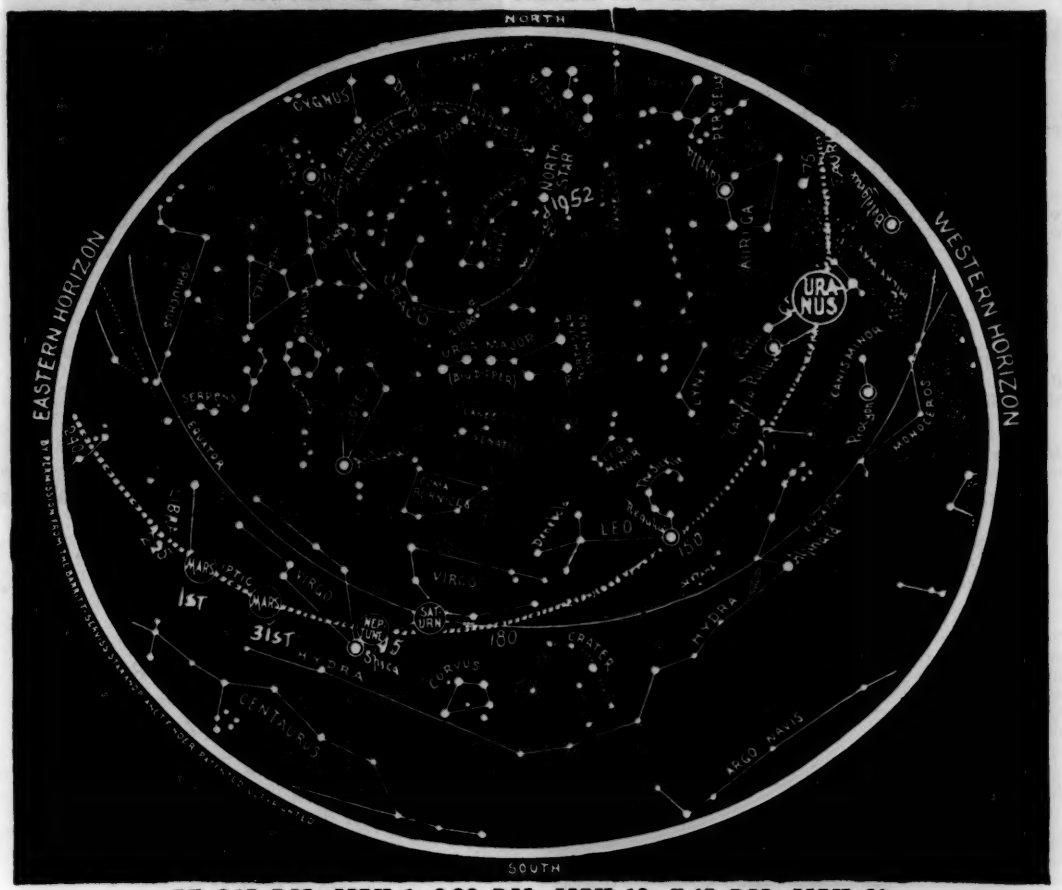
Every heavenly body has a certain critical velocity which is determined by the force of gravity at its surface. A particle of matter travelling in excess of that velocity will escape from the heavenly body in question. For the Earth, this value is 7 miles per second.*

**Reference books disagree — values range from 6.64 m. p. s. to 7.1 m. p. s.*

We all know that if a ball is thrown up into the

XUM

EVENING SKY MAP FOR MAY



AT 9:15 P.M., MAY 1; 8:30 P.M., MAY 10; 7:45 P.M., MAY 21;

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

air, it will travel upward at a decreasing speed, will soon stop, and will then be drawn back by the Earth's gravity. The faster it is thrown, the longer it will stay up; but it must always come back. However, there is a particular speed, called the "velocity of escape", at which a travelling body will not be drawn back by the heavenly body it is travelling away from. The Earth's "velocity of escape" is 7 m.p.s.

And so it becomes evident that we must have a speed of about seven miles per second, to free ourselves completely from the Earth's pull. After we have reached the speed at which the Earth's influence on us ceases, we can turn off the motors and save our precious fuel.

But the human body could not stand a speed of 7 miles per second — at least not all at once! But since at the equator we are travelling around the Earth's center at the rate of 1000 miles per hour, around the Sun at about 18.5 miles per second, and through space with the Sun at the rate of 13½ miles per second, it is known that the human body can stand *any* speed — that it is not mere *speed*, but a *sudden change in speed*, that is dangerous. Therefore, the ship would have to take off very slowly, gradually picking up speed at a rate of no more than 100 feet a second per second, until a speed of 7 miles per second is reached. There is another reason why we could not take off rapidly — the Earth's atmosphere. Friction with the Earth's atmosphere would heat our ship white hot; even with our cooling devices on, the ship would melt or burn up. Therefore we would have to get nearly clear of the Earth's atmosphere before we could begin picking up speed very rapidly.

> *This acceleration of* 100 *feet per second is known as a* 3-*G acceleration produced by the Earth's gravity, and would cause objects to appear to weigh three times as much. This* 3-*G acceleration would be used if the pilot is to remain conscious to direct the take off. A more rapid acceleration, such as* 5-*G* (160 *feet/second/second), would be more economical of fuel, but would cause all crew members to black out, and necessitate automatic controls for the ship. A* 5-*G acceleration is about the greatest a normal human being could stand, for it would make a* 200-*pound man "weigh" half a ton.*

Steering would be done by small secondary motors on the sides. A blast of fuel shot out the left side near the front of the ship would turn us to the right, and vice-versa. A blast shot out of the right side near the rear would turn us towards the right, and vice-versa. Combinations of these motors could be used to give any turning effect we would ever need, whether steering or rotating.

(Please turn to page 10)

XUM

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AMATEUR'S FORUM

By IRVING L. MEYER, M. S.

April, 1952

THE SUN: Moves well into the northern heavens, leaving Pisces to enter Aries. Distance from the earth the 1st is 92.8 million miles compared with 93.6 million miles the 30th.

THE MOON: Is at apogee—farthest from the earth—the 3rd at a distance of 251,000 miles, and is at perigee—closest to the earth—the 18th at a distance of 230,000 miles.

The Moon's Phases (E. S. T.):

First Quarter	April 2 at 3:48 A. M.
Full Moon	10 at 3:53 A. M.
Last Quarter	17 at 4:07 A. M.
New Moon	24 at 2:27 A. M.

MERCURY: Leaves the evening sky the 5th (inferior conjunction with the Sun), and will then be a morning sky object. The last few days of the month it will be visible just before sunrise as a bright stellar object close to the eastern horizon. It will be about the same brightness as Saturn, and since it will be only about ⅜ illuminated, as seen from the earth, it will appear in the telescope as a crescent. Its diameter is around 8" at this time, requiring moderate magnification. Closest approach to the earth, the 8th, is 54.1 million miles.

VENUS: Is still in the morning sky, rising just before the Sun, and no longer well placed for observation. It is so bright, however, that it can still be observed. Magnitude is 3.3 Distance the 1st is 144 million miles, and the 30th is 153 million miles.

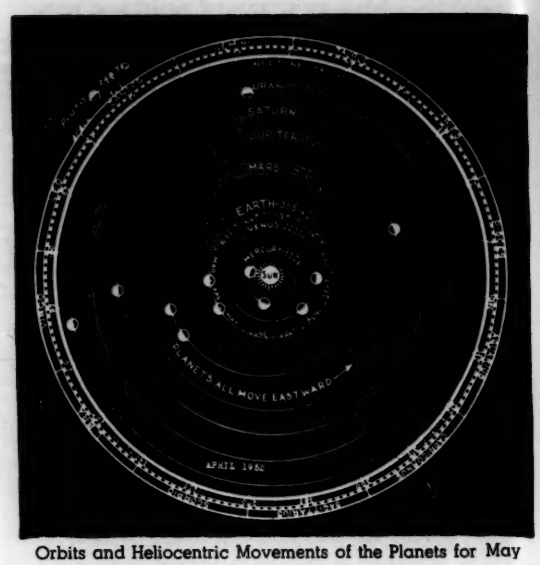
MARS: Retrogrades in Libra, very well situated for observation, particularly from the southern hemisphere. The planet rises just after sunset and remains above the horizon all night. During this month distance decreases from 64 million miles to 53 million miles; magnitude increases from -0.8 to -1.5; and apparent diameter increases from 13.6" to 16.6". It is an interesting object in the telescope, though small for all its brightness, and in that respect likely to prove disappointing. Opposition takes place on the last day of the month.

JUPITER: In Pisces, is in conjunction with the Sun the 17, and enters the morning sky. It is too close to the Sun all the month to be observable. Maximum geocentric distance, the 19th, is 554 million miles.

SATURN: Comes to opposition the 1st in Virgo, and is very well placed for observation. On that date, minimum geocentric distance of 799 million miles makes Saturn a planet of magnitude 0.6. The apparent diameter of the ring system is 44", and the equatorial diameter of the planet itself is 19.4". The ring system can be seen in small telescopes—the northern surface of the rings is opened toward the earth approximately 8°—and some surface markings can be seen with powers of 100 diameters and up. Several of the satellites can be observed in moderate-sized telescopes, with Titan, the brightest, an easy object.

URANUS: Holds forth in Gemini, and sets around midnight. It is a 6th magnitude object and on the borderline of naked-eye visibility. It can be seen easily with opera glasses or binoculars.

NEPTUNE: In Virgo, a few degrees north of Spica, comes to opposition the 10th. It too, is well situated for observation, but is not visible with the unaided eye. Magnitude is 7.7. At its closest, the 11th, distance is 2722 million miles, and apparent diameter is 2½". This disc can be made out with a magnification of 100 diameters on a 6-inch or larger telescope.



Orbits and Heliocentric Movements of the Planets for May

NOTE: The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month, are given for Mercury, Venus and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus and Neptune are shown in the mean position for the current month.

PLANETARY CONFIGURATIONS

Eastern Standard Time

April, 1952

April	1— 5:00 AM	Opposition, Saturn ann Sun
April	1—10:06 PM	Conjunction, Uranus and Moon; Uranus south 3° 36'
April	5— 5:00 AM	Inferior conjunction, Mercury and Sun; Mercury north 2° 36'
April	9— 3:26 PM	Conjunction, Saturn and Moon: Saturn north 6° 50'
April	10— 2:00 AM	Opposition, Neptune and Sun
April	10— 8:01 AM	Conjunction, Neptune and Moon; Neptune north 6° 16."
April	12— 5:48 AM	Conjunction, Mars and Moon; Mars north 6° 43'
April	15— 8:00 AM	Mercury in Descending Node
April	16— 2:00 PM	Conjunction, Mercury and Venus; Mercury north 1° 19'
April	17— 2:00 AM	Conjunction, Jupiter and Sun
April	18— 8:00 PM	Venus greatest heliocentric latitude south
April	17— 3:00 PM	Mercury stationary in Right Ascension
April	22—10:56 PM	Conjunction, Venus and Moon; Venus south 5° 32'
April	22—10:37 AM	Conjunction, Mercury and Moon; Mercury south 5° 32'
April	22—10:56 PM	Conjunction, Venus and Moon; Venus south 5° 49'
April	23— 8:55 PM	Conjunction, Jupiter and Moon; Jupiter south 5° 54'
April	25— 3:00 PM	Mercury in Aphelion
April	29— 7:43 AM	Conjunction, Dranus and Moon; Uranus south 3° 21'
April	30— 8:00 PM	Opposition, Mars and Sun

PLANETARY CONFIGURATIONS

Eastern Standard Time

May, 1952

May	3— 6:00 AM	Mercury greatest elongation west, 26° 45'
May	5— 9:00 AM	Conjunction, Venus and Jupiter; Venus south 0° 19'
May	6— 8:48 PM	Conjunction, Saturn and the Moon; Saturn north 6° 46'
May	7— 3:27 PM	Conjunction, Neptune and Moon; Neptune north 6° 17'
May	8— 9:00 AM	Mars nearest the Earth
May	8—10:28 PM	Conjunction, Mars and Moon; Mars north 5° 30'
May	15—11:00 PM	Mercury greatest heliocentric latitude south
May	16— 9:00 PM	Conjunction, Mercury and Jupiter; Mercury south 1° 45'
May	18— 2:00 AM	Mars in descending node
May	21— 3:58 PM	Conjunction, Jupiter and Moon; Jupiter south 6° 9'
May	22— 5:13 AM	Conjunction, Mercury and Moon; Mercury south 7° 22'
May	22—11:35 PM	Conjunction, Venus and Moon; Venus south 3° 5'
May	26— 6:02 PM	Conjunction, Uranus and Moon; Uranus south 3° 5'

Orbits and Heliocentric Movements of the Planets for May

NOTE: The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month, are given for Mercury, Venus and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus and Neptune are shown in the mean position for the current month.

AMATEUR'S FORUM

By IRVING L. MEYER, M. S.

May, 1952

THE SUN: Is now high in the northern heavens and travels from Aries into Taurus. It is still receding from the earth, the distance increasing from 93.6 to 94.2 million miles during the month.

THE MOON: Is at apogee twice—the 1st at 251,000 miles and the 29th at the same distance; and is at perigee the 13th at 228,000 miles.

The Moon's Phases (E. S. T.):

First Quarter	May 1 at 10:58 P. M.
Full Moon	9 at 3:16 P. M.
Last Quarter	16 at 9:39 A. M.
New Moon	23 at 2:28 P. M.
First Quarter	31 at 4:46 P. M.

MERCURY: Races from Pisces through Aries into Taurus. It is in the morning sky, and reaches greatest elongation west of the Sun, 26° 45', on the 3rd. Therefore, for the first week or so this planet will be visible in the morning twilight, close to the eastern horizon. It will rise considerably in advance of Venus, though the morning light will be strong by the time Venus clears the horizon. Mercury on the 3rd will appear as an 8"-diameter crescent (40% illuminated as seen from the earth), and magnitude 0.6. Distance the 1st is 74 million miles and the 31st is 118 million miles.

VENUS: Is in the morning sky, moving from Pisces through Aries into Taurus. It can no longer be observed readily by reason of its close proximity to the Sun. Distance the 1st is 154 million miles, and the 31st is 160 million miles.

MARS: Retrograding from Libra into Virgo is a brilliant evening sky object, remaining above the horizon most of the night, until just before dawn. Just past opposition, it makes its closest approach to the earth on the 8th at 51.9 million miles. This is one of the poorest oppositions—at a favorable approach Mars' highly elliptical orbit will put it within 36 million miles of the earth. This year, on the 8th, Mars' diameter will be 16.8"; magnitude will be - 1.5. The north polar cap will be tipped toward earth 18° and should be visible under a telescopic magnification of 100% or higher, though it can be considerably shrunken by this time as Martian summer is well along. Users of telescopes, employing 50 power or better, will want to see the prominent Syrtis Major—dark, funnel-shaped marking. This will be in the center of the disc at 3 A. M. E. S. T. on the 1st and 8 P. M. E. S. T. on the 31st. It reaches the center about 36 minutes later each succeeding night.

JUPITER: A morning sky object in Aries, is too close to the Sun for satisfactory observation. Distance the 15th is 547 million miles.

SATURN: Is a bright evening sky planet in Virgo. The 1st of the month it is about 6' (one-fifth the Moon's diameter) south of the 3rd magnitude star Gamma Virginia, making an interesting "Double". Saturn is a very interesting and unique telescopic object. Its ring system can be detected with modest optical aid. Distance the 15th is 824 million miles.

URANUS: In Gemini, now sets early in the evening. Since, at best, it is barely a naked-eye object, this planet will not be easy to pick up this month. Distance the 15th is 1809 million miles.

NEPTUNE: Also in Virgo, is well placed for observation. Magnitude is 8, which precludes naked-eye observation. Small telescopes or good binoculars will reveal it as a faint point of light; 100 diameters on a 6-inch or larger telescope will reveal its dull, gray disc. Distance the 15th is 2737 million miles.

DR. OLIN J. EGGEN
American Astronomer

American Discovery at Australian Observatory

BY P. D. MANTLE.

Working at the Commonwealth Observatory, Mount Stromlo, near Canberra, the national capital of Australia, an American astronomer, Dr. Olin J. Eggen, has reported a variable star with the shortest period ever discovered.

Dr. Eggen came to Stromlo because of the very favourable atmospheric conditions and, because it is an outstanding point of observation of the southern skies.

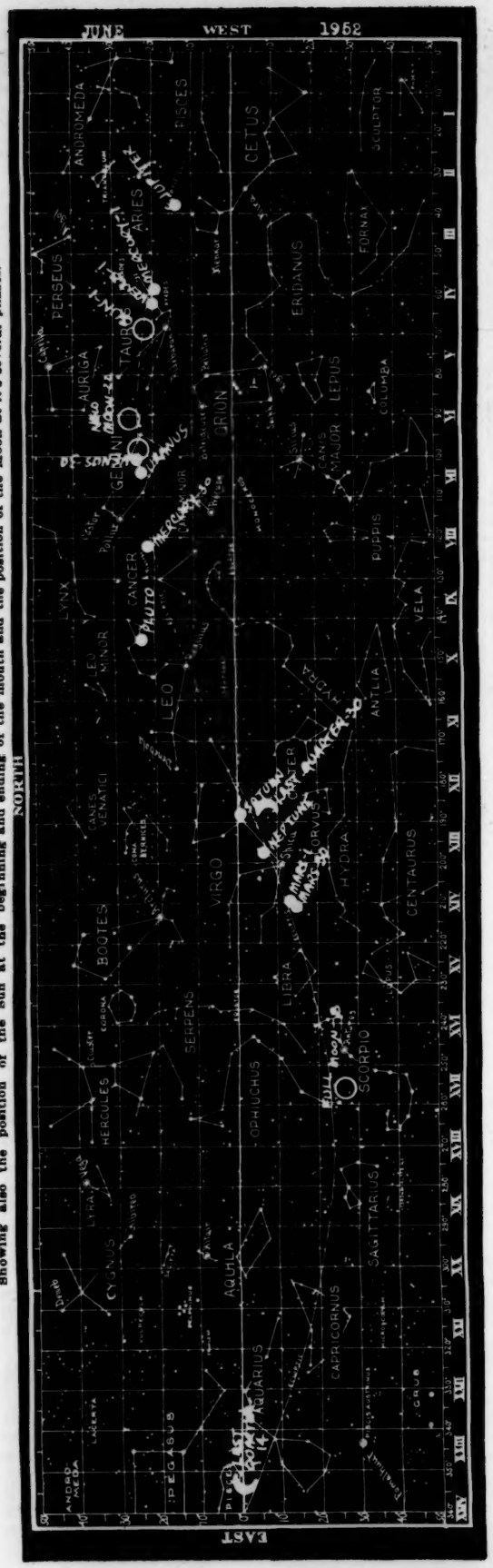
The star, part of the southern constellation Phoenix, has long been known and it can, at times, be seen by the unaided eye, but it has only now been recognised as a variable. As Dr. Eggen says, "Finding a star is like finding a drop of water in the Pacific Ocean. You knew it was there all the time, but you did'nt know much about it until you really studied it."

Dr. Eggen's star is of 6½ magnitudes and is about 120 light years from the earth. This is to say, travelling at 186,000 miles a second, light from the star takes 120 years to reach the earth. That makes it one of the nearer stars. ,

Stars are of constant or variable brightness. Some variables take as long as 400 days in their cycle from dimmest to brighest. An average would be about 10 days. The newly-recorded star goes through its variations in approximately 80 minutes - the shortest time yet discovered. At the point of greatest change, the star doubles its brightness in less than 10 minutes.

Astronomers use variables for measuring distances so great as to be beyond the scope of their usual method of meas-

(Please turn to Page 6)



A MERCATOR PROJECTION OF THE STAR FIELD FOR 50 DEGREES NORTH AND 65 SOUTH OF THE EQUATOR

The Star Field makes an apparent complete revolution westward every 24 hours, hence the hourly division from I to XXIV, but this has no relation to the time that any portion of the map is view. Practical as a Star, Constellation and Planet Finder for the current months—April-May-June, 1952—Anywhere in the world. Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at it's several phases.

(Continued from Page 5)

urement. When they know the distance to variable stars, they are able to calculate distances to stars otherwise immeasurable, and to obtain fresh information on the physics of the universe.

Astronomers are able to arrive at the distance of a variable from the earth because there is known correlation between the period of its variation and its actual brightness or luminosity as distinguished from its observed brightness. When the actual brightness has been determined, the next step is to measure the observed brightness or degree of brightness as it appears from the earth. A further known correlation between the actual and observed brightness then makes possible the calculation of distance.

Discovery of the latest variable is important to astronomers because of its short period of variation, and because of its closeness to the earth.

Its short period of variation means that the change from brightest to dimmest can be observed and timed on 18 occasions in one day. Thus, in a relatively short period a large number of timings can be made and the star's average period of variation (the period is not always the same) can be ascertained to a high degree of accuracy. Obviously, it would take a long time to do a large number of timings and to arrive at a similar degree of accuracy on a star the period of which is 10 days, and many years where it is 400 days.

Moreover, the latest variable is sufficiently close to the earth for its distance away to be measured by conventional proved methods. This, in conjunction with the accurate measure of its period of variability enables astronomers to arrive at an accurate calculation of the period of variability of the 400-day, the 10-day and other variables and so to arrive at their distances.

The latest variable star was observed through a 9-inch Oddie telescope - the original and smallest telescope at Mt. Stromlo. However, equipment used by Dr. Eggen made possible results obtainable otherwise only by use of a much larger telescope. The equipment, known as a photomultiplier, was adapted for astronomical photometery by Dr. G. E. Kron, who came with Dr. Eggen from Lick Observatory, University of California, to work in Australia.

The photomultiplier, using a super "magic eye" or photocell, makes use of an unusually sensitive antimony-cesium photosurface developed by German physicists in 1938. It takes advantage of the principle, that, if starlight falls on a certain type of coated surface electricity is generated. The more light that strikes the surface, the more the resulting electricity, Thus, a measure of the generated electricity is a measure of the brightness of a star. A thermionic valve permits before measurement, amplification of the electricity generated.

With the photomultiplier and filters of high-quality coloured glass, it is possible to measure the colour of starlight and thus the heat of the star. Such a colour sequence involves a temperature sequence (as may be seen when a metal rod is heated in a forge and turns dull red, then a bright cherry colour, next orange, and finally white hot.)

Dr. Eggen feels that discovery of the new variable star has made worthwhile his trip to Australia, apart from other work he has done. He has been in Australia for one year and expects to stay a few more months doing work on variables. It is possible that Lick Observatory will send another astronomer to Australia at a later date, and the Assistant Commonwealth Astronomer, Dr. A. R. Hogg, from Mt. Stromlo will spend some time working at Lick.

Mt. Stromlo is well-suited for astronomical work, - being about 2,600 feet above sea level, clear of industrial haze and the glare of city lights that hamper observations, and with an unusually clear and cloudless atmosphere. Recognizing these advantages, Yale and Columbia Universities in U. S. A., and Upsala University, Sweden have decided to maintain telescopic and teams of observors at Stromlo.

Stromlo is responsible for the time service throughout Australia. Accuracy is to 1/1000 of a second, and this margin will be even less with the installation of a photometric zenith tube telescope. Within the next few weeks a 50-inch telescope will be in use, and the 74-inch telescope that was seen at the Festival of Britain will be erected there.

Another aspect of Stromlo's work is ionospheric prediction to assist radio propagation.

Most of the great observatories being located in the Northern Hemisphere, the Mt. Stromlo Observatory is able to provide supplementary and complimentary data of considerable value to astronomers. It is well on the way to becoming the largest and best-equipped observatory in the British Commonwealth. When teams of scientific workers with their equipment arrive from overseas, it will play an outstanding part in astronomy.

WHAT DOES "CENTAURUS" MEAN?

BY I. L. Thomsen

The name of the Imperial Airways flying boat appears to have made people curious, and in the "Dominion" of January 3rd we read, "Centaurus, in astronomy, is a southern constellation rich in bright stars and globular clusters. Two of these stars in the constellation are known as the Southern pointers since they point to the Southern Cross. One of these stars, Centauri is the third brighest star in the sky and is the earth's nearest neighbor." All this information is quite good, except that Centauri is not a star, and we always thought that the moon was the earth's nearest neighbor. Obviously the star in question is meant to be Alpha Centauri. If our hearing has been correct, then one radio station has twice told listeners that "the Centaurus is named after Centauri, the third brighest star in the sky." But no one seems to have explained why the constellation itself is called Centaurus. Perhaps it is just a mysterious word used by astronomers!

The constellation of Centaurus is supposed to represent the Centaur, which in Greek mythology was a monster—half man and half horse. Cheiron was the most famous Centaur, and we remember the beautiful description given of him in Kingsley's "Heroes." "Down to the waist he was a man, but below he was a noble horse . . . And in his hands he held a harp of gold . . . And he sang of the birth of Time, and of the heavens and the dancing stars; and of the ocean, and the ether, and the fire, and the shaping of the wondrous earth."

There are good pictures of Centaurus as the ancients thought of them in the metopes of the Parthenon at Athens, and in a small statue, now in the Capitoline Museum at Rome. This statue was recovered from a palace in the villa of Emperor Hadrian.

XUM

THE HEAVENS IN JUNE

The sun reaches its greatest declination north of the equator on June 21, and we then have in the northern hemisphere "the longest day of the year" and in the southern hemisphere they have their "shortest day." It is also known as the period of the Summer Solstice in the north and as the Winter Solstice in the south. On December 21, these conditions are reversed, we in the north having the Winter Solstice and they in the south the Summer Solstice.

The name solstice is derived from the two Latin words meaning "the standing still of the sun." This is not to be taken literally, for the apparent progress of the sun eastward is the same from day to day throughout the year. It applies only to these dates in June and December when like a ball thrown high in the air reaching the apexof its curve the sun seems to pause for a moment before it begins to descend.

THE SOUTHERN CROSS

To those visiting the Panama Canal Zone this month, or to any one south of latitude 20, a specially favorable opportunity will be afforded to see in the evening sky the famous constellation, "The Southern Cross," as it will be then most favorably placed for observation, being at its farthest point north. The farther south one travels the higher in the heavens will the Cross appear, and naturally the more conspicuous it becomes. Canopus, the beautiful first magnitude star will be found to the right of the Cross, but further south.

THE GREAT STAR CLUSTER IN HERCULES

This marvelous cluster of suns is now coming finely into view. Its position in the constellation Hercules is shown on the Evening Sky Map. It is visible as nubulous body in an opera glass but with a telescope of 5-inch aperture becomes an object of the greatest interest. Sir William Herschell estimated that it was composed of at least fourteen thousand stars; they are in fact, however, really unacountable.

THE STARS AND CONSTELLATIONS

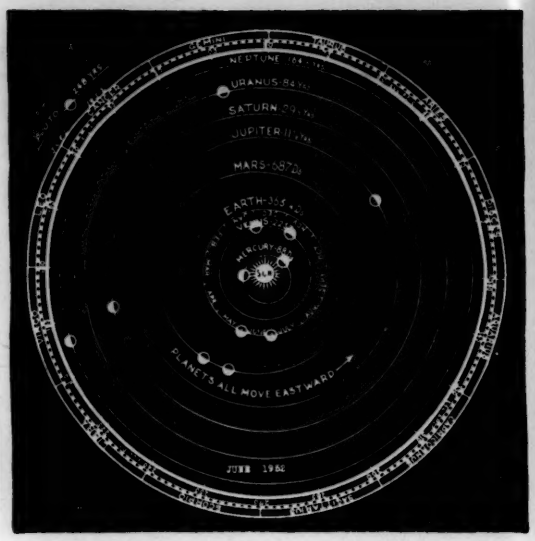
The most beautiful constellations in the Southern part of the sky in the June evenings are Leo, Corvus and Virgo. The "Sickle" of Leo is seen west of the Meridian; then much lower in the South appears the striking quadrilateral of Corvus, and directly South, at a convenient elevation for observation, is Virgo with the brilliant Spica, its brightest star, glowing like a diamond of the purest water. Spica, which appears as a single star in the most powerful telescopes, is nevertheless a double, belonging to the class known as "spectroscopic binaries," because the companion body is dark and its presence is revealed only by the shifting lines in the spectrum, the motion of the lines being caused by the alternate approach and recession of the bright star as it swings round and round with its invisible companion. But the ordinary spectator, having no telescope and no spectroscope at command, will nevertheless be interested in the extreme beauty of Spica, a scintillating point of the purest white light. Its brillancy combined with its great distance proves that it is one of the most powerful radiant bodies in the Universe.

Away over in the Southwest appears one of the most remarkable of the constellations, Scorpio, marked by the presence of a brilliant red star of the first magnitude—Antares. This also is a double, which may be separated with a telescope of four inches aperture. The small companion star is one of a rich green color, contrasting beautifully with the red hue of its greater neighbor. But it can be better seen in July when it is nearer the meridan and farther removed from the mists and the unsteady air of the horizon.

High overhead, following the handle of the Great Dipper, is the splendid constellation Bootes, represented in some of the old pictured charts of the heavens in the form of a tall man holding by a leash a pair of hunting dogs and apparently chasing Ursa Major (the Great Bear) around the pole. For this reason Bootes is often called the "Bear Driver." The brightest star in the constellation and one of the brightest in the whole sky is Arcturus, to which special reference has been made in a former article. The reader should notice the huge triangle whose corners are marked by Arcturus, Spica and Denebola, (or Beta Leonis), in Leo. The distance between Spica and Arcturus is somewhat more than thirty degrees.

East of Bootes shines the circle of the Northern Crown (Corona Borealis), and in the Northeast with resplendent rays glitters the beautiful Vega in the constellation Lyra. The Great Dipper is high overhead with handle to the east, and Cassiopeia is low upon the horizon in the north.

In looking for the planets note the line marked "Path of planets" on the map. If they are in view at all they will be found along this dotted line somewhere and always moving eastward. This is the apparent path of the sun in the day time and the actual path of the moon and the planets in the night time.



Orbits and Heliocentric Movements of the Planets for June

Our map shows that the principle constellations in view this month is Leo, Virgo, Bootes, Corona, Hercules, Crater, Corvus and Hydra. Of these Hydra, the sea serpent is one of special interest, as we now have an opportunity to see what an immense stretch of sky this constellation covers, fully two-thirds of the distance from horizon to horizon.

The figure of the serpent is shown on the front map in dotted outline about the same in the constellation as it is usually shown in the old figure maps. There is a sinuous, snake-like suggestion in this combination of stars and the imagination easily lends itself to the idea. But Corvus, the little constellation of four or five bright stars, that is said to be a crow feasting on the tail of Hydra, might just as happily answer to the name of any other animal.

And Crater, at the right af Corvus, is supposed to represent a cup! Now, no sober, well balanced, self respecting cup ever presented such a lop sided appearance with just claim to the title.

With the advent of summer comes the most delightful season of the year for star gazing. From mountain top and sea shore, from the summer home of the millionaire and porch of the modest home of the farmer hundreds of thousands of eyes pay tribute to the glory of the heavens, the moon, the stars and the planets.

AMATEUR'S FORUM

By IRVING L. MEYER, M. S.

June, 1952

THE SUN: Travelling from Taurus into Gemini, reaches its highest point north of the equator on the 21st, marking the solstice, as it enters the *sign* of Cancer. Distance is 94.2 million miles the 1st, and 94.4 million miles the 30th.

THE MOON: Is closest to the earth the 10th at 225,000 miles, and is farthest the 25th at 252,000 miles.

The Moon's Phases (E. S. T.):

tance, 161 million miles, the 24th. It is too close to the Sun all month for observation.

Full Moon	June 8 at 12:07 A. M.
Last Quarter	14 at 3:28 P. M.
New Moon	22 at 3:45 A. M.
First Quarter	30 at 8:11 A. M.

MERCURY: Moves from Taurus through Gemini into Cancer. It is in Superior Conjunction with the Sun on the 8th, thereafter appearing in the evening sky. It is too close to the Sun all month for satisfactory observation. Maximum geocentric distance, the 9th, is 123 million miles.

VENUS: Also enters the evening sky this month, on the 24th (Superior Conjunction with the Sun). It travels from Taurus into Gemini, and reaches its greatest geocentric dis-

EVENING SKY MAP FOR JUNE

AT 9:00 P.M., JUNE 1; 8:00 P.M., JUNE 15; 7:00 P.M., JUNE 30.

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

tance, 161 million miles, the 24th. It is too close to the Sun all month for observation.

MARS: A brilliant, orange-colored evening star in Virgo, is well placed for observation, setting after midnight. Its rapid recession from the earth (from 56 to 69 million miles during the month) causes magnitude to decrease from -1.1 to -0.5; apparent diameter from 15.5" to 12.6". In addition, by month-end this planet is only 90% illuminated as seen from earth, and will appear definately gibbous as seen in the telescope.

JUPITER: Can now be seen in Aries in the late morning sky, though it is not now well placed for observation. Magnitude of -1.7 makes it a brilliant object. Distance the 15th is 525 million miles.

SATURN: Remains close to Gamma Virginis in Virgo, Just south of the equator. It sets around midnight, and is still conveniently observable. It is bright to the naked eye, and in the telescope even moderate power will reveal the beauty of the ring system. On the 15th, distance is 866 million miles, magnitude is 1.0, ring diameter is 40", and the equatorial diameter of the planet is 18".

URANUS: In the evening sky in Gemini all month, is too close to the Sun to be observable. Distance the 15th is 1835 million miles.

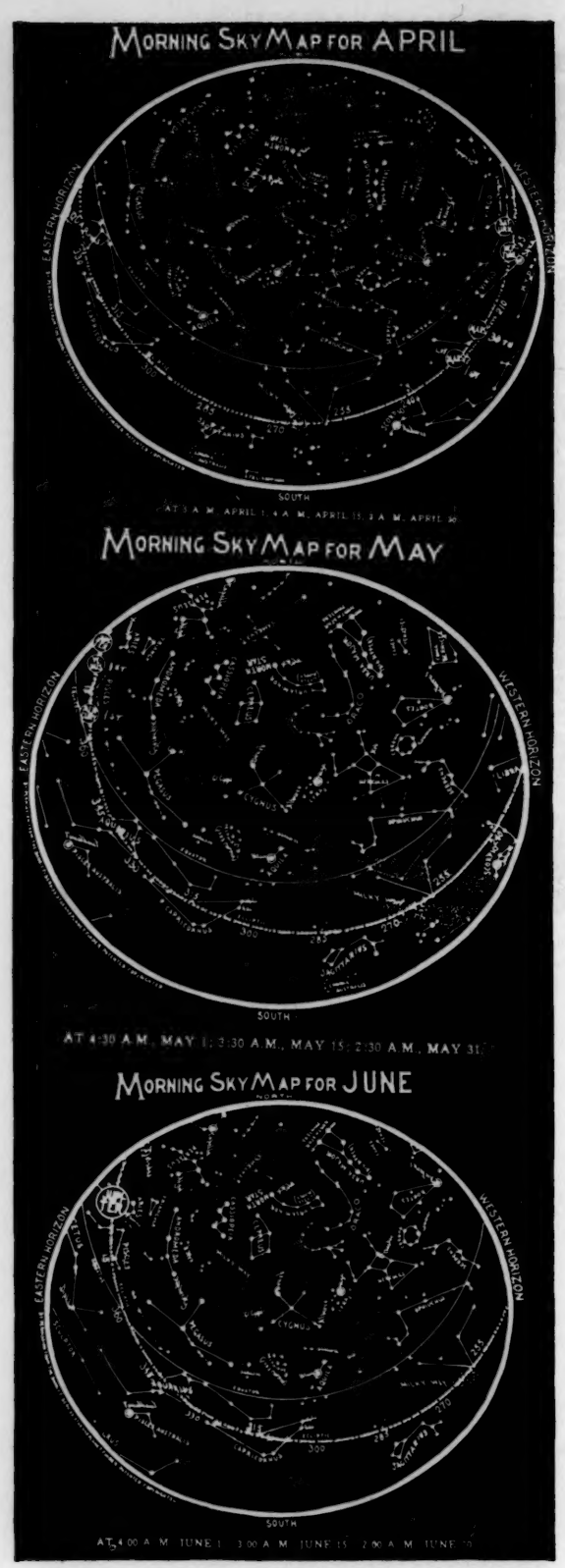
NEPTUNE: Is another occupant of the constellation Virgo, but in brightness (at magnitude 8) is hardly a match for its neighbors. It cannot be seen with the naked eye. Distance the 15th is 2774 million miles.

PLANETARY CONFIGURATIONS

Eastern Standard Time

June, 1952

June	3— 4:14 AM	Conjunction, Saturn and Moon; Saturn north 6° 48'
June	3—11:59 PM	Conjunction, Neptune and Moon; Neptune north 6° 25'
June	4—12:00 AM	Mercury in Ascending Node
June	b—11:00 AM	Conjunction, Mercury and Venus; Mercury north 0° 28'
June	4— 8:22 PM	Conjunction, Mars and Moon; Mars north 4° 15'
June	8— 3:00 PM	Mercury in Perihelion
June	8— 9:00 PM	Superior conjunction, Mercury and Sun; Mercury north 0° 50'
June	10— 7:00 PM	Mars stationary in Right Ascension
June	11—10:00 AM	Saturn stationary in Right Ascension
June	14— 4:00 AM	Venus in Ascending Node
June	18— 8:46 AM	Conjunction, Jupiter and Moon; Jupiter south 6° 23'
June	18— 9:00 PM	Mercury greatest heliocentric latitude north
June	20— 5:00 PM	Conjunction, Mercury and Uranus; Mercury north 1° 34'
June	21— 6:13 AM	Sun enters Cancer; Solstice
June	22— 2:12 AM	Conjunction, Venus and Moon, Venus south 3° 45'
June	23— 4:06 AM	Conjunction, Uranus and Moon; Venus south 2° 45'
June	23— 2:50 PM	Conjunction, Mercury and Moon; Mercury south 0° 56'
June	24— 4:00 PM	Superior conjunction, Venus and Sun; Venus north 0° 25'
June	30— 5:00 AM	Quadrature, Saturn and Sun
June	30— 1:12 PM	Conjunction, Saturn and Moon; Saturn north 6° 56'
June	30— 5:00 PM	Neptune stationary in Right Ascension


MORNING SKY MAP FOR APRIL
EASTERN HORIZON
WESTERN HORIZON
SOUTH
AT 3 A.M. APRIL 1; 2 A.M. APRIL 15; 1 A.M. APRIL 30
MORNING SKY MAP FOR MAY
EASTERN HORIZON
WESTERN HORIZON
SOUTH
AT 4:30 A.M. MAY 1; 3:30 A.M. MAY 15; 2:30 A.M. MAY 31
MORNING SKY MAP FOR JUNE
EASTERN HORIZON
WESTERN HORIZON
SOUTH
AT 4:00 A.M. JUNE 1; 3:00 A.M. JUNE 15; 2:00 A.M. JUNE 30

THE PUBLISHER OF THE MONTHLY EVENING SKY MAP will appreciate the kindly interest of its subscribers in sending the names of those whom they think to be interested in the study of the "STARS". We will take pleasure in sending them sample copies.

(Continued from Page 3)

If we are going faster than 7 m.p.s., it will be impossible to stop or slow down, because (assuming that there are no other bodies influencing us), the Earth will be unable to pull us towards it. We have turned our motors off, and are going freely, at our original speed. The only way to stop or slow down would be to have a secondary motor in the front end of the ship to shoot blasts of fuel out the front end, and slowly counteract the force which started us. We could no more stop all at once than we could start going at such a high speed all at once. It would take about seven minutes to slow down from a speed of 7 m.p.s. to nothing

The seven-minute deceleration figure assumes a 3-G deceleration, equivalent to a 3-G acceleration, as before a more rapid deceleration could be used. It may be preferable to have only one large motor, in the rear of the ship, and to brake for the landing by turning the ship around (using the small steering motors on the sides), then using the large motor in the same manner as in a take-off.

CHAPTER III NECESSITIES ABOARD

A—WATER

The problem of getting water is easier than it seems. We would carry with us as much drinking water as possible, but this would run out before we had completed our stay on the Moon or the planet to which we are going. However, there is a very easy way of conserving water — distillation!! Our water, after having been used, would be piped to the "water room" where it would be distilled, and the pure water made available for reuse.

B—AIR

Although the problem of getting air seems complicated, it is in reality much simpler than it seems. We must remember that it is the oxygen from the air that we breathe; the other gases in the air are exhaled. Plants take in carbon dioxide and give out oxygen. To keep a supply of oxygen constantly in the air in the ship, we would simply have to have plants. Pumpkin plants are good oxygen producers. The chlorophyll in plants, which breaks up the carbon dioxide molecules, works only during the daytime, so we would have to have sun-lanmps focused on them.

The plants would have to be fastened down by sheets of metal with openings just large enough for their stems. In space, where the pull of gravity from any heavenly body is extremely slight, water would not pour, would merely float out of a container, and would be hard to salvage again. Plants could be watered by a system of pipes running through their boxes, up under the metal sheets. This would, of course, use up some of our valuable water, but, as plants give off water vapor, perhaps we could salvage that and condense it for use. However, it would still be wise to carry cans of liquid oxygen.

C FOOD

Food would really be our biggest problem. We would have to carry canned food or food which would not spoil, and vitamin tablets.

D MISCELLANEOUS

The crew would all have to wear suits with lead as a protection from the ultra-violet, cosmic, and gamma rays and searing electrons from the Sun. Lead might be incorporated in the walls of the ship, but this would make them much better conductors of heat (See Chapter II A).

In space, without gravity, nothing would have any weight. Everything that was not fastened down would

float through the air. Food would have to be kept in closed containers, and when it was to be eaten, the container would have to be carefully opened, and the food punctured with a fork. Liquids would drift out of glasses and a mass of liquid would be seen floating in the air like a balloon. Liquids would therefore have to be squirted into the mouth. The crew, also, would weigh nothing, and we would have to fasten ourselves down by means of magnetism. We could wear magnetic shoes and have a sheet of iron on the rocketship's floor, or wear iron shoes and have a sheet of magnetized iron on the floor.

If our ship is to be sealed up, we will be getting no light from the Sun. Since we will be in perpetual darkness inside, we will need electric lights. The power for the lights will come from batteries, as will the heat for distillation.

These methods for obtaining necessities are described on the assumption that we are to keep our "payload" to a minimum and that long trips or long stopovers are contemplated. It would be more convenient to have an unlimited supply of water without having to resort to distillation, and of oxygen without having to use plants. This would be possible if a very large ship were being constructed and a large payload allowed. It is possible to create a "real" artificial gravity within the living quarters of the ship which would be effective for all objects and eliminate the necessity for magnetized shoes. The cabin could be suspended in such a manner that it could be revolved around some point as a center, as the Earth revolves around the Sun. The centrifugal force produced by the revolution would "push" all objects towards the floor of the cabin with the proper force, giving the illusion of a floorward "gravitational" pull. A large radius of revolution and a low angular speed would be necessary to prevent dizziness.

(*Continued Next Issue*)

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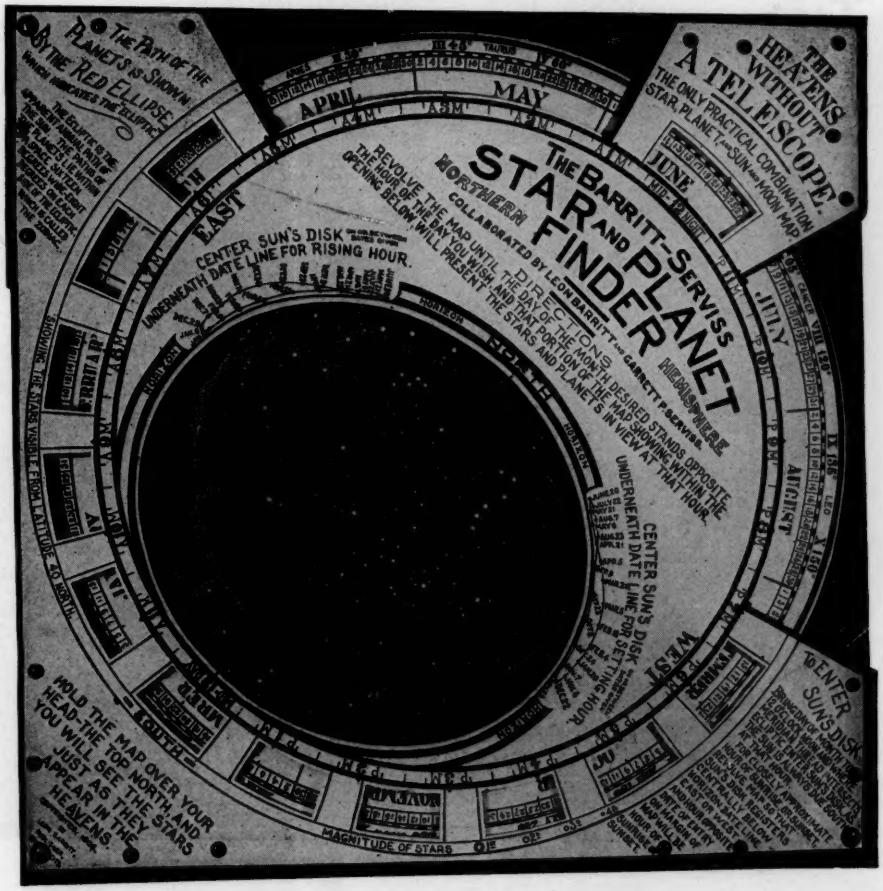
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DIRECTIONS
REVOLVE THE MAP UNTIL THE DAY OF THE MONTH DESIRED STANDS OPPOSITE THE HOUR OF THE DAY YOU WISH AND THAT PORTION OF THE MAP SHOWING WITHIN THE OPENING BELOW WILL PRESENT THE STARS AND PLANETS IN VIEW AT THAT HOUR.
CENTER SUN'S DISK UNDERNEATH DATE LINE FOR RISING HOUR.
CENTER SUN'S DISK UNDERNEATH DATE LINE FOR SETTING HOUR.
EAST
WEST
SOUTH
APRIL
MAY
JUNE
JULY
AUGUST
HOLD THE MAP OVER YOUR HEAD-THE TOP NORTH AND YOU WILL SEE THE STARS JUST AS THEY APPEAR IN THE HEAVENS.
MAGNITUDE OF STARS
TO ENTER SUN'S DISK

Perseus
HOWARD A CHRISTENSEN